We claim:-

1. A graft polyol having a bimodal particle size distribution and a total solids content of from 5 to 65% by weight, containing small particles having a particle diameter of from 0.05 to 0.7 μm and large particles having a particle diameter of 0.4 to 5.0 μm, the peaks of the large and small particles measured by the light scattering method not overlapping, and a total content of the solids having the defined particle sizes consisting of a volume fraction of from 5 to 45% of small particles and a volume fraction of from 95 to 55% of large particles, these volume fractions summing to 100%.

2. A graft polyol as claimed in claim 1, which contains small particles, which are characterized by a peak which begins in a range of from 0.05 to 0.08 μm and ends in a range of from 0.4 to 0.7 μm and large particles which are characterized by a peak which begins in a range of from 0.4 to 1.0 μm and ends in a range of from 1.2 to 5.0 μm, measured in each case by the light scattering method, the measured peaks not overlapping.

3. A graft polyol as claimed in claim 1 or 2, which has a viscosity at 25°C which is at least 5% lower than a graft polyol having a monomodal particle size distribution and exclusively small or large particles, assuming that the graft polyols to be compared do not differ in solids content and in the starting materials.

4. A graft polyol as claimed in any of claims 1 to 3, wherein the small particles have a diameter of from 0.1 to 0.5 μm and the large particles have a diameter of from 0.5 to 4.0 μm.

5. A graft polyol as claimed in any of claims 1 to 4, wherein the total solids content of the graft polyol is from 10 to 50% by weight.

6. A graft polyol as claimed in any of claims 1 to 5, wherein the total content of the solids having the defined particle sizes consists of a volume fraction of from 10 to 40% by weight of small particles and a volume fraction of from 90 to 60% by weight of large particles, these volume fractions summing to 100%.

7. A process for the preparation of graft polyols having a bimodal particle size distribution as claimed in claim 1, wherein at least one graft polyol having a monomodal particle size distribution with small particles which have a diameter of from 0.05 to 0.7 μm and at least one graft polyol having a monomodal particle size distribution with large particles which have a diameter of from 0.4 to 5.0 μm are mixed with one another in a ratio such that the total solids content of the resulting graft polyol having a bimodal particle size distribution consists of a volume fraction of from 5 to 45% of small particles and a volume fraction of from 95 to 55% of large particles, the volume fractions summing to 100%.

8. A process as claimed in claim 7, wherein the graft polyol having a monomodal particle size distribution with small particles which is used is one having a particle diameter of from 0.1 to 0.5 μm.

9. A process as claimed in claim 7 or 8, wherein the graft polyol having a monomodal particle size distribution of large particles which is used is one having a particle diameter of from 0.5 to 4.0 μm

10. A process as claimed in any of claims 7 to 9, wherein the graft polyol having a monomodal particle size distribution with small particles is used in a volume fraction of from 10 to 40% and the graft polyol having a monomodal particle size distribution of large particles is used in a volume fraction of from 90 to 60%, these volume fractions summing to 100%.

11. A process for the preparation of a graft polyol having a bimodal particle size distribution as claimed in claim 1 in a semibatch process, wherein the initially taken reaction mixture contains in each case at least one carrier polyol, a macromer and a graft polyol having a monomodal particle size distribution, more than 3% by weight of the solids content in the resulting graft polyol consisting of the solids content of the graft polyol used in the initially taken reaction mixture and having a monomodal particle size distribution, and the weight of the macromer used in the initially taken reaction mixture is from 1 to 30% by weight, based on the total weight of the ethylenically unsaturated monomers used, which is at least sufficiently large that small particles are formed in the further course of the reaction.

12. A process as claimed in claim 11, wherein the amount of macromer used in the initially taken reaction mixture is from 2 to 15% by weight, based on the amount of the ethylenically unsaturated monomers used for the resulting graft polyol.

13. A process as claimed in claim 11 or 12, wherein the macromer is a polyol having an average molecular weight of more than 2 000 g/mol and a functionality of [illegible], which possesses at least one terminal, polymerizable, ethylenically unsaturated group.

14. A process as claimed in claim 13, wherein the macromer is a polyol having an average molecular weight of more than 3 000 g/mol.

15. The use of a graft polyol as claimed in any of claims 1 to 6 for the preparation of polyurethanes.

16. A process for the preparation of polyurethanes by reacting organic and/or modified organic polyisocyanates (a) with graft polyols (b) and, if required, further compounds (c) having hydrogen atoms reactive toward isocyanates, in the presence of catalysts (d), if required water and/or other blowing agents (e) and, if required, further assistants and additives (f), wherein the graft polyols (b) used are those having a bimodal particle size distribution and a total solids content of from 5 to 65% by weight, containing small particles having a diameter of from 0.05 to 0.7 μm and large particles having a diameter of from 0.4 to 5.0 μm, the peaks of the large and small particles measured by the light scattering method not overlapping, and a total content of solids having the defined particle sizes consisting of a volume fraction of from 5 to 45% of small particles and a volume fraction of from 95 to 55% of large particles, these volume fractions summing to 100%.

# Graft polyols having a bimodal particle size distribution, preparation of such graft polyols and their use for the preparation of polyurethanes

Abstract

Graft polyols having a bimodal particle size distribution and a total solids content of from 5 to 65% by weight, containing small particles having a diameter of from 0.05 to 0.7 μm and large particles having a diameter of from 0.4 to 5.0 μm, the peaks of the large and small particles, measured by the light scattering method, not overlapping, and a total content of the solids having the defined particle sizes consisting of a volume fraction of from 5 to 45% of small particles and a volume fraction of from 95 to 55% of large particles, these volume fractions summing to 100%, are prepared.

Said graft polyols are used for the preparation of polyurethanes.